

1 I claim:

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1 1. A circuit for lighting an electro-luminescent device, comprising:

2

3 a voltage source;

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5 an electro-luminescent device having a high voltage connection and a  
6 grounded low voltage connection;

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8 a switching converter comprising;

9

10 a first inductor having first and second ends, said first end of  
11 said first inductor being connected to said voltage source;

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13 a second inductor having first and second ends, said first end of  
14 said second inductor being connected to said voltage source and  
15 to said first end of said first inductor;

16

17 a first switching device having a first end and a grounded second  
18 end, said first end of said first switching device being  
19 connected to said second end of said first inductor at a first  
20 junction;

21

22 a second switching device having a first end and a grounded  
23 second end, said first end of said second switching device being  
24 connected to said second end of said second inductor at a second  
25 junction;

26

27 an oscillating switch driver electrically connected to said first  
28 and second switching devices such that said first switching  
29 device is closed when said second switching device is open, and  
30 such that said first switching device is open when said second  
31 switching device is closed; and

32

a transformer device comprising;

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33 a first input electroactive disk having first and second opposing  
34 electroded major faces and polarized in a thickness direction  
35 normal to said first and second opposing electroded major faces  
36 such that upon application of voltage across said first and  
37 second opposing electroded major faces, said first and second  
38 opposing electroded major faces deform radially;

39 said first electroded major face being electrically  
40 connected to said first junction;

41 said second electroded major face being electrically  
42 connected to said second junction;

43  
44 a first output electroactive disk having first and second  
45 opposing electroded major faces and polarized in a thickness  
46 direction normal to said first and second opposing electroded  
47 major faces such that upon application of voltage across said  
48 first and second opposing electroded major faces, said first and  
49 second opposing electroded major faces deform radially;

50 said first electroded major face being electrically  
51 connected to said high voltage connection of said electro-  
52 luminescent device;

53  
54 a constraint layer mechanically bonded between said first  
55 electroded major face of said first input electroactive disk and  
56 said first electroded major face of said first output  
57 electroactive disk such that said constraint layer at least  
58 partially constrains said radial deformation of said first  
59 electroded major face of said first input electroactive disk;

60  
61 wherein said constraint of said radial deformation of said first  
62 electroded major face of said first input electroactive disk  
63 prevents said first electroded major face of said first input  
64 electroactive disk from radially deforming as much as said second  
65 electroded major face of said first input electroactive disk  
66 radially deforms such that there exists a difference between the



2  
3 wherein said difference between the amounts of radial deformation of  
4 said first and second opposing electroded major faces of said first  
5 output electroactive disk creates a shear strain in said first output  
6 electroactive disk.

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1 6. The circuit of claim 5,

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3 wherein said mechanical bond of said constraint layer is selected from  
4 the group of bonds formed through processes comprising cofiring  
5 together said constraint layer and said input and output electroactive  
6 disks, adhering together said constraint layer and said input and  
7 output electroactive disks, and combinations thereof.

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1 7. The circuit of claim 6, wherein said transformer device further  
2 comprises:

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4 a second input electroactive disk having first and second opposing  
5 electroded major faces and polarized in a thickness direction normal  
6 to said first and second opposing electroded major faces such that  
7 upon application of voltage across said first and second opposing  
8 electroded major faces, said first and second opposing electroded  
9 major faces deform radially; and

10  
11 a first mechanical bond attaching said first electroded major face of  
12 said second input electroactive disk to said second electroded major  
13 face of said first input electroactive disk such that said second  
14 electroded major face of said first input electroactive disk at least  
15 partially constrains said radial deformation of said first electroded  
16 major face of said second input electroactive disk;

17  
18 wherein said constraint on said radial deformation by said second  
19 electroded major face of said first input electroactive disk prevents  
20 said first electroded major face of said second input electroactive  
21 disk from radially deforming as much as said second electroded major

22 face of said second input electroactive disk radially deforms such  
23 that there exists a difference between the amounts of radial  
24 deformation of said first and second opposing electroded major faces  
25 of said second input electroactive disk.

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1 8. The circuit of claim 7, wherein said transformer device further  
2 comprises:

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4 a second output electroactive disk having first and second opposing  
5 electroded major faces and polarized in a thickness direction normal  
6 to said first and second opposing electroded major faces such that  
7 upon application of voltage across said first and second opposing  
8 electroded major faces, said first and second opposing electroded  
9 major faces deform radially; and

10

11 a second mechanical bond attaching said first electroded major face of  
12 said second output electroactive disk to said second electroded major  
13 face of said first output electroactive disk such that said first  
14 electroded major face of said second output electroactive disk at  
15 least partially constrains said radial deformation of said second  
16 electroded major face of said first output electroactive disk;

17

18 wherein said difference between the amounts of radial deformation of  
19 said first and second opposing electroded major faces of said first  
20 output electroactive disk creates a shear strain in said first output  
21 electroactive disk;

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23 and wherein said radial deformation of said second electroded major  
24 face of said first output electroactive disk radially strains said  
25 first electroded major face of said second output electroactive disk  
26 via said third mechanical bond;

27

28 and wherein said radial deformation of said first electroded major  
29 face of said second output electroactive disk is greater than a radial  
30 deformation of said second electroded major face of said second output

31 electroactive disk such that there exists a difference between the  
32 amounts of radial deformation of said first and second opposing  
33 electroded major faces of said second output electroactive disk;  
34  
35 and wherein said difference between the amounts of radial deformation  
36 of said first and second opposing electroded major faces of said  
37 second output electroactive disk creates a shear strain in said second  
38 output electroactive disk.

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1 9. The circuit of claim 8,

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3 wherein said direction of polarization of said first input  
4 electroactive disk is opposite said direction of polarization of said  
5 second input electroactive disk.

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1 10. The circuit of claim 9,

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3 wherein said direction of polarization of said first output  
4 electroactive disk is opposite said direction of polarization of said  
5 second output electroactive disk.

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1 11. The circuit of claim 10,

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3 wherein said first and second switching devices comprise first and  
4 second transistors.

5

1 12. The circuit of claim 11,

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3 wherein said oscillating driving device comprises a dual output gate  
4 driver having an input pin, an inverting output pin and a non-  
5 inverting output pin;

6 said inverting output pin being connected to a gate of said first  
7 transistor;

8 said non-inverting output pin being connected to a gate of said  
9 second transistor; and

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11 an oscillator having an output pin for transmitting an oscillating  
12 voltage signal, said output pin of said oscillator being electrically  
13 connected to said input pin of said oscillating driving device.

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1 13. The circuit of claim 12,

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3 wherein said oscillator comprises a trigger pin and a threshold pin, a  
4 resistor and a capacitor;

5 said trigger pin being electrically connected to said threshold  
6 pin;

7 said resistor being connected between said trigger pin and said  
8 output pin;

9 said capacitor having a grounded first end and a second end  
10 connected between said resistor and said threshold pin.

11

1 14. The circuit of claim 13, further comprising:

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3 a feedback subcircuit having an input side and an output side;

4 said input side of said feedback subcircuit being electrically  
5 connected to said high voltage connection and said low voltage  
6 connection of said electro-luminescent device

7 said output side of said feedback subcircuit being connected to said  
8 threshold pin of said oscillator.

9

1 15. The circuit of claim 14, further comprising:

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3 a dimmer electrically connected between said first electroded major  
4 face of said first output electroactive disk and said high voltage  
5 connection of said electro-luminescent device.

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1 16. The circuit of claim 14, further comprising:

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3 a dimmer electrically connected between said voltage source and said  
4 first and second inductors.

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1 17. The circuit of claim 16,  
2 wherein said feedback subcircuit comprises a subcircuit selected from  
3 the group consisting of voltage sensing, current sensing, phase  
4 sensing and combinations thereof.

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